Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

A GEOGRAPHIC STUDY OF DULUTH*

BY

EUGENE VAN CLEEF, S.B.
Department of Geography, State Normal School, Duluth, Minn.

The Harbor and Water Transportation. The Duluth harbor (Fig. 16), as stated above, is formed by the union of the tapering southwestern extremities of Lake Superior with the mouth of the St. Louis River. Two long sand spits have formed across the bay, one extending for a distance of seven miles from the Minnesota shore at right angles to Duluth and the other a distance of three miles from the Wisconsin shore parallel to Superior. The natural entrance to the Duluth-Superior harbor, therefore, is located seven miles from Duluth. The pioneers of this vicinity were not slow to observe the disadvantage of that distance and to see the possibility of making a gateway immediately in front of Duluth. Little time was lost in proceeding with the construction of a ship canal across the spit (Fig. 16), which at once stimulated activities in Duluth.

Navigation between the Lake Superior and the lower lake ports during the season of 1910 covered a period of 245 days, but "the open season for Duluth-Superior harbor, to and from Lake Superior ports only, was much longer, as navigation was closed to the local boats only a few weeks during the year."†

The long sand spit, Minnesota Point, now a sand bar since the building of the ship canal, is one of the primary causes for Duluth's almost unexcelled harbor. It is perfect protection against storm waves, and therefore makes the handling of the commerce in the harbor absolutely easy. Because of the excellence of this harbor and that of other harbors on the great lakes with which commerce is carried on, the boats carrying cargoes of coal, iron ore and wheat have been enlarged, until to-day 500-foot freighters drawing eighteen to twenty feet are common and boats over 600 feet in length not unusual. While the harbor is dredged to a depth of twenty-two to twenty-six feet, if necessary it could be dredged to a depth per-

---

*Concluded from *Bulletin*, June, 1912, pp. 401–417.

† "Marine Commerce, Duluth-Superior, 1910." G. D. Fitch, Lieut.-Col. U. S. Engineers, Duluth.

mitting it to accommodate the world's largest boats, which draw 30 to 36 feet of water. These boats that approach close to a thousand feet in length could turn around easily in the spacious harbor; they could also anchor without difficulty, as the sandy bottom facilitates firm anchorage.

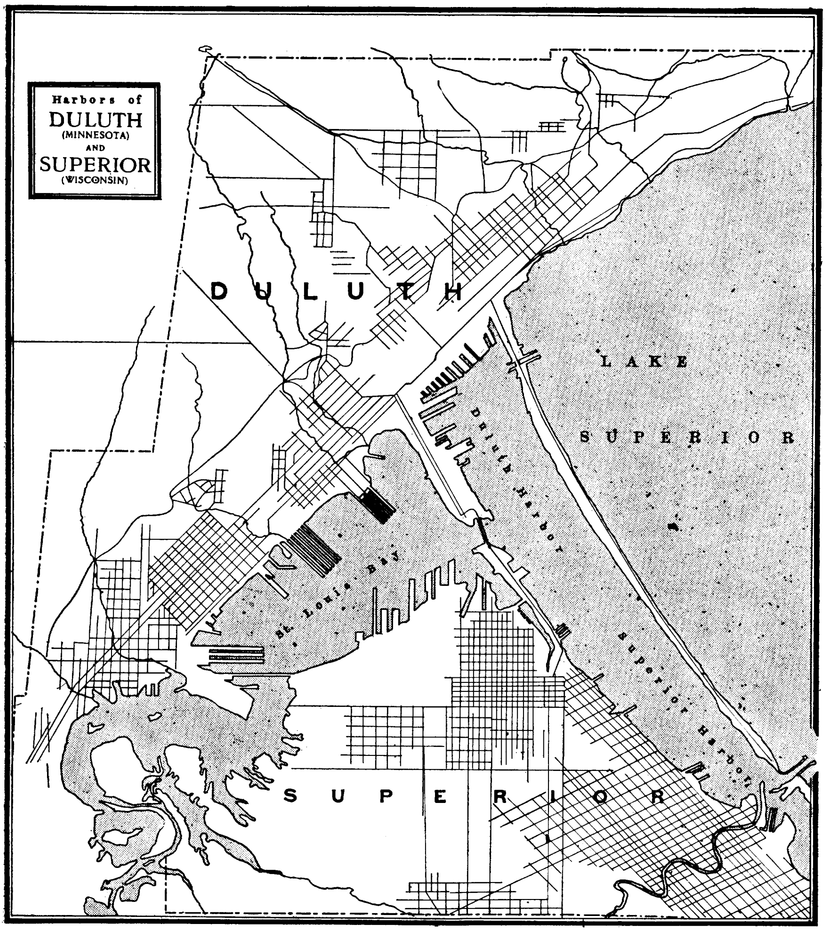

FIG. 16.

The ideal conditions for the best harbor may be stated to be: Easy approach; protection from heavy waves; deep channel; spaciousness; bottom for firm anchorage; a minimum of silting; absence of strong currents; easy communication with the hinterland. Every one of these conditions may be found in Duluth harbor, with the possible exception of the last one, which, however, is true in a modified form. The approach from the east, south and southwest is easy, but from the west, northwest and north somewhat more difficult because of the presence of the range referred to above under Topography. This obstacle, however, is fast being overcome by tunneling and grading, so that it will soon be a negligible quantity.

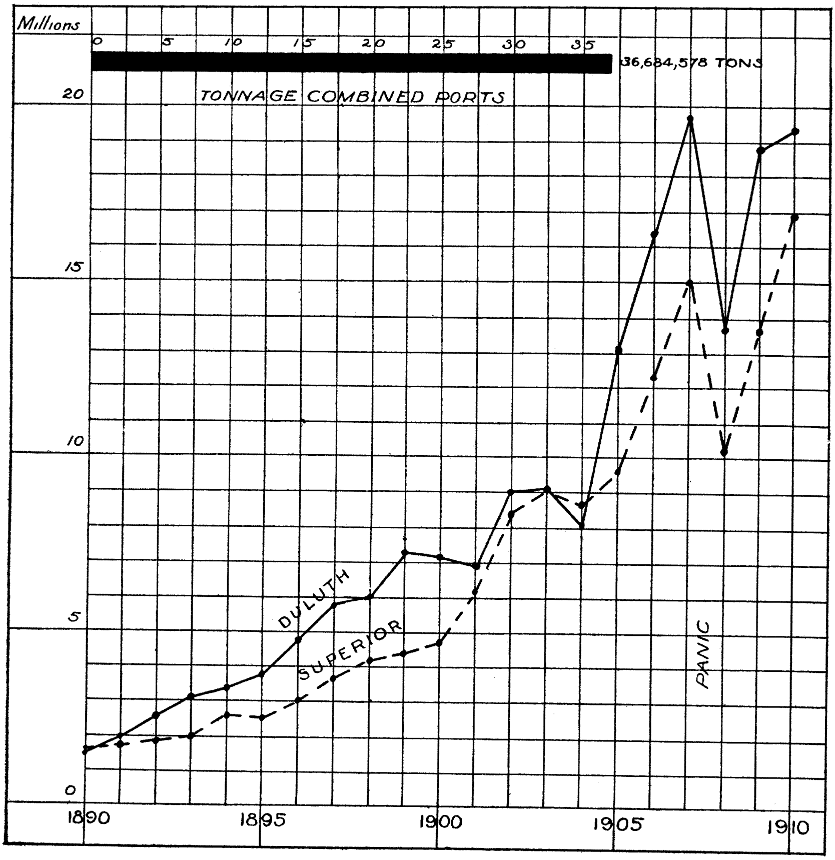

FIG. 17—Vessel freight received and shipped, Duluth and Superior.

The spaciousness of the harbor, combined with the jutting peninsulas that afford a long shore line and therefore large dockage possibilities, is of consequence. The length of docks influences the length of boats which will put into a harbor, and also influences very materially the cost of unloading and loading a boat. Duluth's harbor, as well as that of Superior, permits of the construction of docks of greatest length necessary, as well as of the kind necessary to accommodate any sort of boats at a minimum cost.

"Combining Duluth and Superior, the area accessible to railroads now existing as wharfage is 664 acres, and area available is 4,069 acres. The net total number of acres, including the present wharf and possible wharves, allowing for certain space necessary for slips, is 4,733 acres. The entire harbor space, including Minnesota Point and Big Island, which are now inaccessible to railroads, includes eleven square miles, or 7,040 acres. At present, but one-seventh of the available space is occupied by wharves in operation and under construction. The lineal quayage, excepting the distances measured along slips, is forty-nine miles."*

These figures show impressively the tremendous capacity of the harbor, and the almost unlimited space for the expansion of commerce. A comparison of this harbor with a few of the world's great harbors is striking.

At Liverpool and Birkenhead, England, the basin occupies 583 acres and a lineal quayage of thirty-six miles, 255 yards. At Rotterdam, Holland, the harbor covers an area of 460 acres and has twenty-three miles of quayage. Hamburg, Germany, has a total water area of 1,282 acres and a lineal quayage of over fifteen miles. It has "in addition twenty-one miles of riverside and canal accommodations for river craft."†

Such unusual facilities have resulted in the development of water traffic, as shown in Fig. 17. Excepting in 1904, the total vessel freight received and shipped at Duluth has exceeded that of Superior. The total tonnage for both ports in 1910 was 36,684,578 short tons. In general, the commerce has been upon a very rapid increase, except for the notable year of 1908, when the financial panic bore its influence. The striking recovery immediately after the panic is partly a result of the nature of the products making up the commerce of the harbor, and partly due to excellent storage and dockage facilities of the harbor.

The Sault Ste. Marie Canal, at the eastern extremity of Lake Superior, has the largest tonnage among all the world's canals. Fig. 18 shows what that tonnage has been for the years 1901 to 1910 inclusive, having reached nearly 50,000,000 in 1910. This is the vessel tonnage which, of course, includes a large variety of commodities. The freight tonnage of Duluth during the past five years has averaged about 38 per cent. of the total vessel tonnage passing through Sault Ste. Marie. The net iron ore tonnage for Duluth for the same period has averaged about 75 per cent. of Duluth's total freight tonnage. Comparing the fluctuations in the total output of iron ore with variations in Duluth's total net freight tonnage, and with the vessel freight tonnage of Sault Ste. Marie, the very close relation of the tonnage through the canal and the commerce of Duluth's harbor is readily seen. This is one of many illustrations which may be cited to demonstrate the fact that the Duluth harbor influences the tonnage in the great lakes region more than any other harbor. In fact, no other harbor on the lakes has a tonnage equal to that of Duluth, nor has equal facilities for handling a tonnage as large.

---

* For Duluth the area of existing wharves accessible to railroads is 305 acres and the area available for additional wharves is 1,790 acres. "Report upon the Improvement of Rivers and Harbors in the Duluth, Minn., District." G. D. Fitch, Lieut.-Col. in charge.

† J. Paul Goode, "Development of Commercial Ports." Report of Chicago Harbor Commission, 1908.

It is impractical to compare the tonnage of the Duluth harbor directly with that of ocean ports, because record of domestic tonnage is not kept at the custom houses, and hence a comparison of the records of the custom houses on the lakes and on the ocean would be faulty. However, comparing the average monthly tonnage movement for the eight months' season of navigation of the Duluth-Superior harbor with the average for other American ports, Duluth ranks probably next to New York.*

LOCAL GEOGRAPHIC CONDITIONS

Handicaps. If two places offer practically equivalent opportunities, and it is left for a group of people to choose between them, that place which makes the stronger appeal, either esthetically or materially, will be chosen. Duluth certainly might have appealed to the esthetic sense years ago, when Superior was first founded, just as it does to-day. But Superior was a progressive town years before Duluth started. It is true that the slope of the range offers magnificent sites for residences. The view over the harbor is inspiring, and undoubtedly when the forests still occupied much of the surface was much more so than to-day. The question, then, as to why Duluth, with a later start than Superior, should have grown to a city nearly twice its size cannot be answered directly on the basis of a more beautiful location for homes. The site of Duluth is by no means as practical for a city as that of Superior, because building is difficult and expensive, due to the haul of materials up steep grades; because foundations for the most part must be blasted in rock; because street cars consume a very much greater amount of electric power climbing hills than when running on level ground; and because the wear and tear on them, as well as on all vehicles, is at a maximum. The cost of distribution of commodities is necessarily high because of the hills to climb. Loads must be light and hence small.

---

* Marine Commerce, Duluth-Superior, 1910. G. D. Fitch, Lieut.-Col. U. S. Engineers, Duluth.

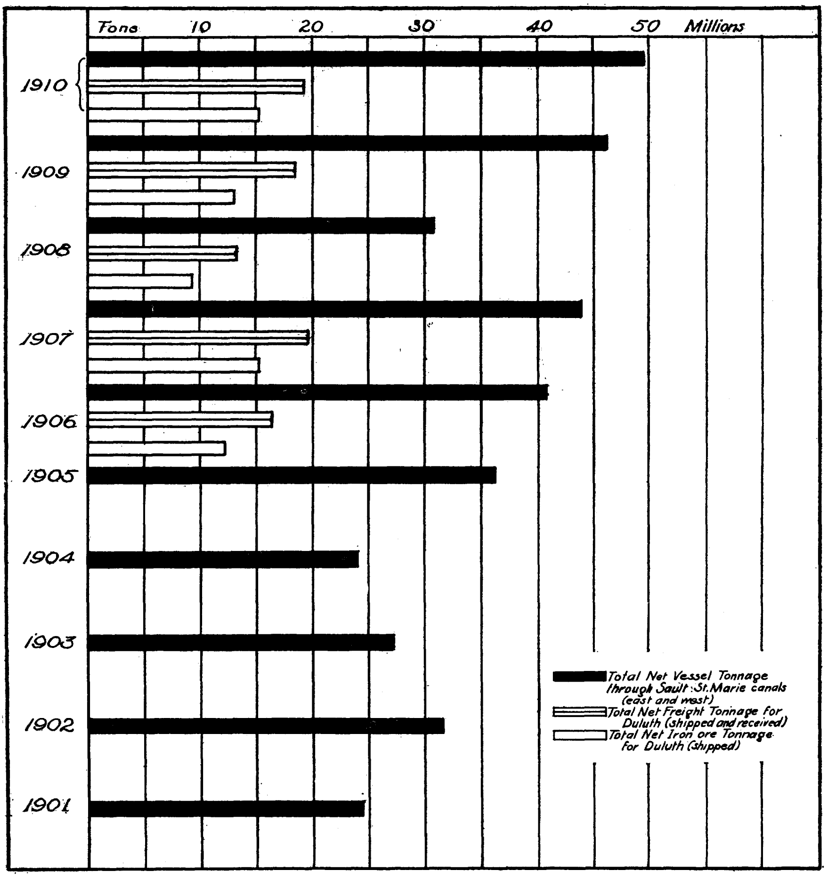

FIG. 18—Tonnage through Sault Ste. Marie Canals.
References: U. S. Statistical Abstract, 1910; Marine Commerce, Duluth, Superior; U. S. Eng. Office, 1906–1910.

The approach to Duluth by railroads from westerly and northwesterly directions is difficult. The area available for terminal yards is all too small; in fact, it will not accommodate present needs, and will undoubtedly remain a handicap until some double-decked or triple-decked system of railroad terminals is adopted.

Advantages. Then why, with all the above apparent disadvantages, should Duluth have become the city that it is to-day, with 78,466 people, but with activities representing in general a city of 150,000, and in specific instances a city of 1,000,000?

Why is not the iron ore carried to the Superior side, where the land is flat? Because it is located at Duluth's back door; Duluth is located at the nearest, best accessible point to the lake. Because it is much easier and far less expensive to bring the boats seven miles nearer Duluth, and to let them carry the load back over those seven miles again and on to Sault Ste. Marie and the lower lakes, than to let the railroads carry the ore seven miles across bridges and viaducts to Superior. If it were cheaper to carry the ore to the flat land across the bay, where railroad terminal facilities are much better in many respects, the ore would be carried there. If a method should be found whereby it will be cheaper to take the ore across the bay and load it on boats there, that will be done. Large quantities of ore are shipped to Superior docks now as the result of improved railroad facilities and competition among railroads. However, up to the present time the difference in distance has been a most potent factor in determining Duluth's supremacy over Superior as an iron ore shipping point.

A secondary observation is worth noting, namely, that the ore boats on their return from the lower lakes bring coal. This coal they may dock at the nearest docking point, which is Superior. Hence, they may enter the natural channel at Superior, unload their coal, cross the bay to the ore docks, load the ore and leave via the ship canal to return to the East.

Inasmuch as the ore business is most advantageously conducted from the Duluth shore, those controlling the business will certainly choose the more beautiful site for their residences; hence, Duluth becomes their home. Laboring men employed on the ore docks locate their residences near their work. The needs of these men, such as food, clothing, etc., must be supplied; therefore, stores of various kinds are established. Secondary industries arise. These, combined with incidental factors that center about and grow out, directly and indirectly, from a localized industry of tremendous proportions, develop a large community—another reason for the existence of Duluth.

A second important influencing factor in Duluth's situation may be advanced at least as theory, if not fact. Throughout the history of the world the boats of all explorers have penetrated inland as far as the waters ahead would carry them. Merchants on the seas have always traded with points as far inland as their boats would take them. Almost without exception, the farthest easily accessible inland point has become the terminus of water transportation, with the other points en route as way-stations. In the United States a few examples may be cited: Providence, R. I., at the head of Narragansett Bay; Philadelphia, Pa., on the Delaware River, well above the head of the bay; Baltimore, Md., close to the head of Chesapeake Bay; Mobile, Ala., at the head of Mobile Bay; and New Orleans, La., at the head of tide-water 100 miles up the Mississippi River.

In Canada, Quebec had been for centuries the head of navigation on the St. Lawrence River; but recently the improvements in the river, making it possible for ocean boats to reach Montreal, farther up the river, made it the head of navigation and Quebec a way-station. Manchester, England, located 36 miles from the head of the estuary of the Mersey River, has been an inland city, with Liverpool as the seaport. Manchester constructed a canal, so that boats may now pass Liverpool, go up the canal and trade directly with Manchester. A complete change has not come as yet, but Liverpool's commerce has been affected; its rates on commodities have been lowered. It is very probable that so far as freight is concerned Manchester may be the head of navigation just as soon as the prestige and tradition of Liverpool's centuries of trade are broken.

So in the case of Duluth, though but seven miles from Superior, it is the farthest inland point and accordingly boats are destined for it as the terminus, and not for Superior. So long as Duluth continues to maintain its harbor facilities and remain the farthest inland point it will control the lion's share of commerce of the Duluth-Superior harbor. Duluth lies on the farther or western bank of the St. Louis River, and though but a short distance across is Superior, with an equally good dock frontage, the Duluth side has, by virtue of its geographic position, naturally developed much more rapidly.

Population. The population of Duluth is heterogeneous. Among the various types of peoples, the Scandinavians and Canadians are found in largest numbers. Of those people who are actively engaged in the control of the business and public affairs of the city, essentially all are still of the original generation of settlers. The city is not yet old enough for the second generation to take the leading part in its movements. Of the first generation, essentially all are either foreign-born or natives of the Eastern and Central States.

With a mixture of a wide variety of peoples, a complex mass of ideas necessarily accumulates. Adjustment of different peoples to the same natural environments is in process. Such adjustments may be completed upon a compromise or balance of different ideas, conservative, progressive and retrogressive. The result of this fusion of thought in a community of generally strong, vigorous, energetic peoples is almost certain to be in favor of progress. In the case of Duluth, just that progressive spirit has resulted. The preponderance of a type of people, namely, the Scandinavians, who are accustomed in their home country to the rigors of this northerly clime, makes for a population that does not easily succumb to hardships, but rather overcomes them.

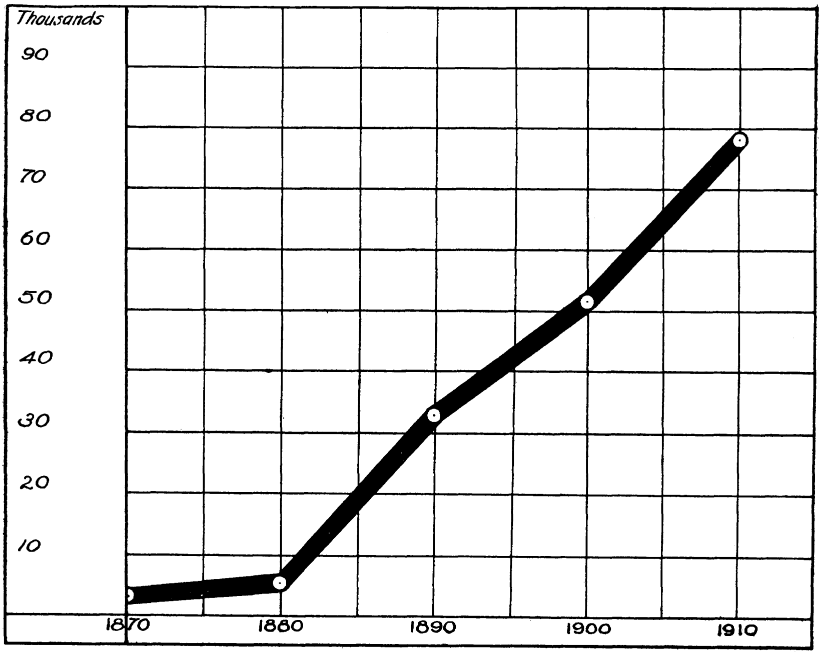

FIG. 19—Increase of Population. Duluth, 1870–1910.—U. S. Census.

The rapid growth of the city is shown strikingly in Fig. 19, the absolute increase in population, and Fig. 20, the per cent. of increase in population. Duluth has held to the pace set by the world's largest port cities and has passed the State of Minnesota. For the decade of 1900-1910 the per cent. of increase was larger than that of either the State, London, New York or Chicago.

The distribution of population within the city is interesting. The industrial establishments are located along that part of the harbor which borders the southwest end (called West End) of the city. The northeast end (called East End) is located beyond the harbor, along the shore of the broad expanse of lake. The laboring class lives near its place of business; the wealthier class as a whole lives at a distance from its place of business. This does not imply a difference in the quality of citizenship, but illustrates, in part at least, the principle of the effect of the localization of industries upon the localization of types and kinds of people. The East End is an almost exclusive residence district, whereas the West End is peopled by a mixed or middle class of people.

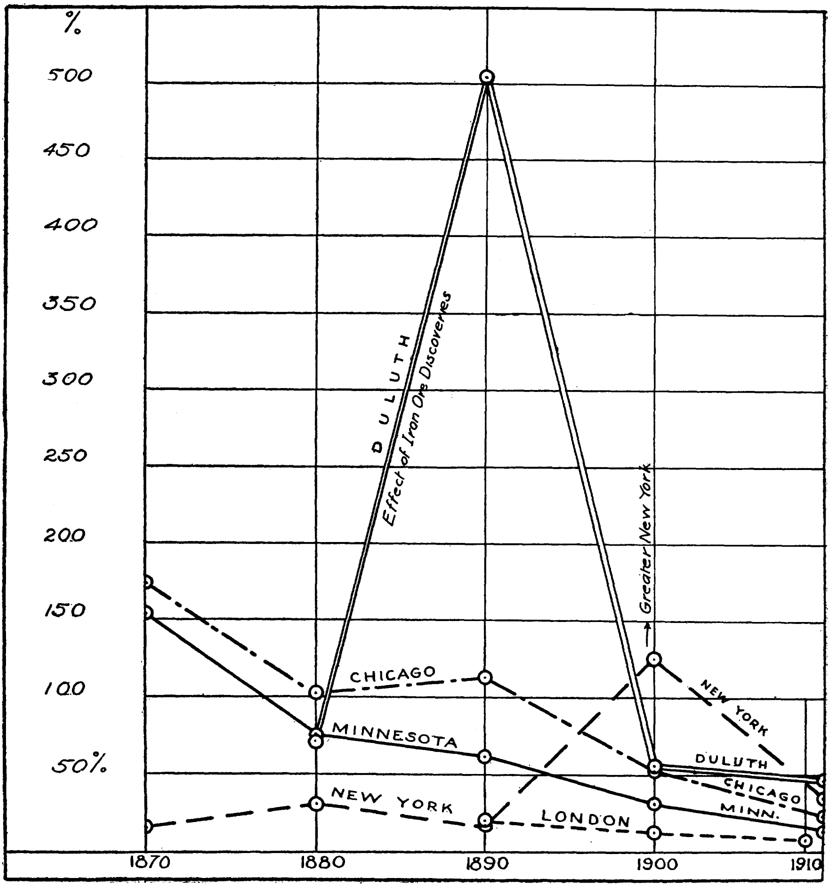

FIG. 20—Comparison of per cent. of increase in population for port cities and Minnesota. Note that Duluth's rate of increase has kept pace with other leading ports and its own state.

Permanence of Duluth. The permanence of any city is dependent upon the available food supply. Mineral resources are exhaustible and therefore will buy food only for a limited period. Mineral resources alone do not invite a large population; they must be accompanied by food to support the people who market them. Duluth has a mineral resource of highest value, but at present it is unaccompanied by extensive food supplies. Foodstuffs must be brought from miles around. This means that freight charges are added to the selling prices, for which the consumer must pay. It is universally true that the mass of the people who can earn a living in almost any locality will choose that place where the cost of living is lowest. Food and clothing constitute the largest expense of the average individual. Therefore, despite the valuable resources and the bright prospects for much work ahead, working men are not attracted if food and clothing are high-priced. In Duluth the iron ore, coal, grain and lumber products which are shipped to the city for distribution afford much work for many men. General merchandise stores, established to support this working class, in turn demand clerical help. But the number of people willing to come to this city for such work, as well as for other occupations, is limited owing to Duluth's lack of a home food supply. The food cost is high; the cost of clothing is likewise high.

Duluth's hinterland, that supplies the iron ore, the prime factor in the city's present stability and past growth, will soon be without ore. The citizens of this generation need to provide for those of one or two generations ahead. What is the prospect? Money is necessary for the purchase of food. With the waning suppies of iron ore, less money becomes available for the buying of food. This must result necessarily in a very great increase in the price of food, if not altogether in a scarcity of food. Under such conditions the city seems doomed. This is not mere theory. Cities in the history of the world have risen to great prominence; have built wonderful edifices; have reigned supreme, only later to fall into decay. There may be skyscrapers built; there may be unexcelled steel structures erected; but if the food is prohibitive because of its cost to the citizens, those signs of progress, it seems, must come to an end. Thriving cities not far distant from Duluth, located in iron ore districts, have risen during the past twenty-five years, but now, because their sole resource is disappearing and agriculture is impossible, they are decaying rapidly.

What, then, are the future possibilities of Duluth? The shipping facilities are unexcelled for trade in all directions. With the opening of the Georgian Bay canal by the Canadian government (Fig. 1) boats will come direct from Europe to Duluth. They may transfer their cargo here for Western ports, whence they may be shipped across the Pacific Ocean to the Orient.

The total distance by boat to Liverpool, via this canal and the St. Lawrence River and Atlantic Ocean, will be 4,208 statute miles.* The distance to-day from New York to Liverpool is 3,571 miles, only 637 miles nearer. The total distance between Duluth and Liverpool, via lake and New York Central Railway from Buffalo to New York, is 4,996 miles, or 788 miles farther than via the proposed new route. The new route will permit a much more rapid and less expensive transit between Europe, the East and the West. Chicago will no longer be the sole distributing center for the western country but will have to share its trade with Duluth.

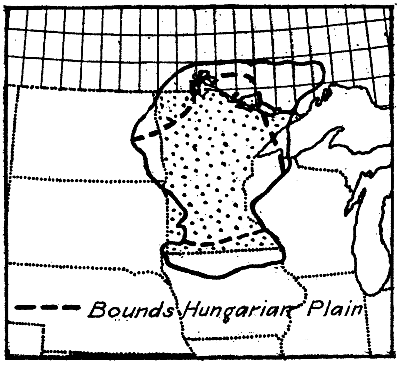

FIG. 21—Hungary superposed on Minnesota and oriented so as to bring the plains area coincident with the plains of Minnesota.

Agricultural Possibilities. An effort is made in the above discussion to show that Duluth has favorable climatic conditions for man. It can be demonstrated that it possesses a climate favorable to the cultivation of truck garden products, favorable to the dairying industry, and even to the production of wheat on a large scale. At present, farmers are actually gaining very successful returns from local production. What might be done in Duluth's hinterland and the State as a whole is best illustrated by a comparison of Minnesota with Hungary (Fig. 21). Hungary has an area of 109,007 square miles, compared with Minnesota's 87,000 square miles. In 1900 it had a population equal to 19,254,559. In 1910 Minnesota had a population equal to 2,075,708. Of the total population in Hungary, 6,055,390 were engaged in agriculture and 13,175,083 were supported by it. Hungary's iron ore resource is very small compared with Minnesota's. The country is agricultural throughout. In Fig. 21 Hungary has been oriented so that the agricultural area, namely, the Valley of the Danube, indicated by the broken line, coincides almost exactly with agricultural Minnesota. Wheat is the principal crop of Hungary. Wheat is the principal crop of Minnesota. Hungary raises a variety of other crops, thus enabling it to supply all of its people with a variety of food at low cost. In fact, it goes so far as to levy a tariff upon most imported foodstuffs. Minnesota can grow a variety of crops also.

---

* "Georgian Bay Ship Canal Survey." Department of Public Works, Ottawa, Canada.

The latitude of the Danube Valley, or Hungarian plain, is essentially the same as that of Minnesota extending from about 45°N. to 49°N. The country is sufficiently far from the seas to possess a climate largely continental in character—not unlike that of Minnesota. If Hungary is capable of producing results such as mentioned, the possibilities in Minnesota, which possesses perhaps a far greater progressive spirit, seem almost unlimited. Surely a population many times the present can be supported at a low cost; Duluth need not be at any time subject to the catastrophe of decay even after the last pound of iron ore is shipped. If the citizens develop their agricultural hinterland, they may continue to bend their energies fearlessly toward the upbuilding of a great distributing center; they may safely proceed to develop the city as a manufacturing metropolis. Although there is no coal, there are 80,000 potential horse-power in the falls of the St. Louis River; 45,000 horse-power are now available, and nearly all in use.

The permanence of Duluth lies not in its iron ore resource but in its ability to secure a permanent food supply. That assured, all its other exceptional facilities may be developed without limit and a city of millions may grow.

BIBLIOGRAPHY.

Board of Trade Report, Chicago, 1910.

Board of Trade, Duluth.

Burchard, E. F. Production of Iron Ore, Pig Iron and Steel in 1910, Advance Chapter, Mineral Resources of the United States, U. S. G. S., 1910.

Canada, Department of Public Works, Georgian Bay Ship Canal Survey.

Carey, J. R. History of Duluth and Northern Minnesota.

Chamberlin & Salisbury. Geology, Vol. III—1904.

Commercial Club of Duluth. Annual Report Public Affairs Committee 1911; A Memorial in Re Rail and Lake Rates, July, 1910—Traffic Commission; "Cows in Clover"; "Duluth, the Zenith City of the Unsalted Seas."

Daily News. Illustrated Annual Edition, 1888.

Ensign, J. D. History of Duluth Harbor, 1898.

Fitch, G. D., Lieut.-Col. U. S. Engineers Office, Duluth, 1910. Report upon Improvement of Rivers and Harbors in the Duluth, Minn., District, 1910; Marine Commerce, Duluth-Superior, 1905-6-7-8-9-1910.

Goode, J. Paul. The Development of Commercial Ports, Report Chicago Harbor Commission, 1908.

Great Northern Power Co. Commercial Engineer, Duluth.

Hall, C. W. The Geography and Geology of Minnesota, Vol. I, 1903.

Hartley, G. G. The Cost of Living and How to Reduce It, 1911.
Leggett, W. F., and. Chipman, F. J. Duluth and Environs, 1895.
Milne, J. Scott. Great Destiny of Duluth, 1900.
Marshall-Wells Hardware Co., Duluth.
Phelps, Wm. F. The Heart of Our Northwestern Empire, 1900.
Statesman's Year Book, 1910.
Turner, J. M. Lake Superior Regions, 1888.
U. S. Government Publications. Statistical Abstract, 1910; Census Reports, 1900, 1910; Local Office U. S. Weather Bureau Records.
U. S. Engineer's Office Assistants.
Van Hise, C. Conservation of Natural Resources.
Van Hise and Leith. *Bulletin* 360, U. S. G. S.; Pre-Cambrian Geology of U. S., 1910.
Washburn, J. L., Duluth. Personal Interviews.
Winchell, N. H. Geological and Natural History Survey of Minn., Vol. 4, 1896-1898.
Woodbridge, Dwight E., & Pardee, John S. History of Duluth and St. Louis County, 1910.
Atlases and Maps. Diercke Schul-Atlas; Franks' Real Estate Atlas of Duluth; Maps in Dodge Geography, Minnesota Supplement (Rand, McNally & Co.); Map of Duluth-Superior Harbor, U. S. Hydrographic Office; Rand-McNallv Atlas of the U. S.; Wall Map of Duluth by U. G. Wellbank.

A NEW MAP OF THE AMERICAN SAMOAN ISLANDS

In the April, 1912, number of *Petermanns Mitteilungen* a new map was published of Tutuila and of the Manua group of the Samoan Islands which embodies the results of original surveys made in December, 1910, by Dr. Kurt Wegener of the German seismological observatory at Apia. In view of the fact that these islands belong to the United States and that Dr. Wegener's delineation of them differs considerably from that on the relevant charts published by the Hydrographic Office, the map from *Petermanns Mitteilungen* (in two sections: one showing Tutuila and the other the Manua group) is reproduced herewith. The publication of this map seems all the more timely as, according to recent correspondence with the bureaus concerned, the U. S. Coast and Geodetic Survey, under whose jurisdiction would fall the survey of the coasts of these islands since their cession to the United States in 1900, is not contemplating a survey of the islands at present owing to other claims on its time, and the U. S. Hydrographic Office, under whose auspices the only extant official American maps of the islands or of parts of them are published, is likewise contemplating no extensive resurvey in the